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Suicidal Ideation, Suicidal Attempts and Self-Harm in the United Kingdom Armed Forces

Running Head: Self Harm in the United Kingdom Armed Forces

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Conflict of interest

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Ethical standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Abstract

Introduction: In the United Kingdom military, suicide is infrequent and studies of self-harm behaviour in this population are rare. **Objectives:** To compare lifetime self-harm rates estimated on three occasions between 2004 and 2016 and to explore the associates of lifetime self-harm. **Method:** Three phases of a UK AF cohort study (n=10272, 9990 and 8581 respectively) provided data. Telephone interviews assessed associates of self-harm among cohort members who reported subjective mental health problems in the past three years (n=1448). Validated measures of mental health and related stigmatisation, social support and help-seeking were obtained. **Results:** Lifetime self-harm increased significantly (p<0.001) from 1.8% among serving personnel and 3.8% among veterans in 2004/06 to 1.9% and 4.5% in 2007/09 and to 4.2% and 6.6% in 2014/16 in the two groups respectively. Veterans were consistently significantly more likely to report lifetime self-harm than serving personnel. Significant determinants of lifetime self-harm included current mental disorder symptoms, stigmatisation, poor social support, suicidal ideation and seeking help from formal medical sources. **Conclusion:** Self-harm has increased over time in the UK serving and veteran community. Suicide prevention should focus on ameliorating mental disorder by encouraging engagement with healthcare, reducing negative views of mental illness and fostering social support.

Introduction

The United Kingdom Armed Forces (UK AF) are a professional military force comprised of approximately 150,000 air, sea, and land forces and an additional complement of approximately 36,000 volunteer reserves. Suicide is a relatively low frequency event in the UK AF[1] while research examining suicide attempts (SA) and self-harm (SH) is scarce. A study published in 2012 reported a lifetime SH prevalence of 5.6% among UK military

personnel; the rate was 4.2% among serving personnel and 10.5% among ex-Service veterans[2]. Further UK studies have estimated an overall SH prevalence of 2.3%; 1.8% among serving personnel and 3.5% among ex-Service veterans[3]. A UK study of death by suicide suggested that the higher rate of suicide found among ex-Service veterans may have been related to the preponderance in this group of young men with pre-Service vulnerabilities who were discharged early in their military career[4]. Open access UK military reports confirm the low rate of SH in UK AF personnel. Using official report data, the SH rate was estimated to be 2.8 per 1000 personnel (0.3% of all UK military personnel) in 2016 to 2017. Army personnel, women and young junior ranks were identified as being at heightened risk for SH[5].

Given that academic studies reporting SH and SA among UK AF personnel have not been published for some years, the current study sought to provide a contemporary account of UK military SH by firstly comparing rates over time using cohort study data and secondly, by exploring SH in a cohort sub-sample that provided data during a detailed telephone interview study. Two research questions were addressed:

1. Has the rate of SA and SH in the UK AF changed over the course of three independent measurements obtained between 2004 and 2016?

2. What are the socio-demographic, military, mental health and mental health-related associates of SA and SH?

Method

To address question one, the prevalence of lifetime SH was estimated using self-reported data derived from three phases of the King's Centre for Military Health Research (KCMHR) cohort study. KCMHR is an independent research unit that receives funding from the UK Ministry of Defence to carry out original research among military personnel and ex-serving

veterans. The number of individuals participating at the three phases was 10272 during phase one (P1) (2004/06), 9990 at phase two (P2) (2007/09) and 8093 at phase three (P3) (2014/16). Phase 1 of the cohort study sought to examine the health consequences of deployment to Iraq in 2003 for UK AF personnel[6]. A random sample of UK military personnel who deployed to Iraq in 2003 and a random sample of personnel at risk of deployment but who did not deploy was obtained. Phase 2 incorporated existing cohort members, a new random sample of UK AF personnel at risk of operational deployment (the replenishment sample) and a further randomly selected sample of personnel who had undertaken deployment to Afghanistan[7]. Phase 3 surveyed existing cohort members and a further randomly selected replenishment sample[8]. At each study phase, potential cohort participants were identified from military records as belonging to specific sub-groups, for instance regular and reserve forces, personnel who had deployed to Iraq or Afghanistan, male or female gender and not belonging to special forces. In phases 2 and 3, new cohort recruits were required to be fully trained and ready to deploy. At each phase of the cohort study, random sampling of sub-groups was undertaken until a pre-determined power requirement was met; military personnel belonging to sub-groups of interest were over-sampled (for instance, reserves and women). Offers to complete the in-depth survey were made by post. All participants provided written consent. As the cohort is a longitudinal study, increasing numbers of participants became ex-serving veterans as the study progressed.

Question two, relating to the associates of SA and SH, were derived from a detailed telephone interview study. The telephone interview study sample consisted of individuals drawn from the three Services (Royal Navy and Royal Marines, Army and Royal Air Force), both serving and ex-serving veterans, who were invited to take part in detailed telephone interviews if, in phase 3 of the main cohort study, they endorsed having experienced a mental health, stress or emotional or problem in the previous three years and had consented to further

contact[9]. All potential participants were contacted by telephone and were sent a participation pack consisting of study information and response cards. All gave further written consent to participate. A total of 2017 phase 3 participants met the inclusion criteria for the interview study of which 1713 were randomly selected and invited to participate in telephone interviews. 1450 interviews were completed; 263 people did not consent to participate or were uncontactable, giving a response rate of 84.7%. 1448 participants were included in the final analyses as two complete records were lost during a server failure. The telephone sample was not representative of the UK AF as it represented a sub-sample derived from the larger cohort study.

All study data was collected with King's College London and Ministry of Defence Research Ethics committee approval; all participants provided verbal and/or written consent.

Measures

In the main cohort study, the question asked at phase 1 was 'before, during or after your military career have you ever purposely harmed yourself?' at phases 2 and 3 it was 'have you ever purposely harmed yourself?' The questions were developed specifically for the cohort study and on each occasion were embedded in a list of additional questions which asked about the presence or absence of illnesses such as asthma. Single questions assessing self-harm and suicidality have been used in peer-reviewed publications[10 11 12].

To examine the associates of SA and SH, participants in the telephone interview study were asked detailed questions about mental health, alcohol use, wellbeing, help-seeking behaviours, suicide attempts, suicidal ideation and episodes of SH. We chose to use suicidal ideation as a predictor variable to explore its relationship with SA and SH. Mental health measures embedded in the telephone interview schedule included the 9 item Patient Health

Questionnaire (PHQ-9)[13], the 7 item Generalized Anxiety Disorder scale (GAD-7)[14]; the 20 item PTSD checklist for DSM-5 (PCL-5)[15] and the abbreviated Alcohol Use Disorders Identification Test (AUDIT-C)[16]. These measures assessed depression, anxiety, posttraumatic stress disorder symptoms (PTSD) and alcohol misuse by determining conventional cut-off scores. These were ≥15 for the PHQ-9 (moderately severe depression), ≥10 for the GAD-7 (moderate anxiety), ≥38 for the PTSD checklist (indicative of PTSD caseness)[17]. Following the conventions of using higher cut-off scores in previous studies of alcohol use in the UK AF[18 19], an AUDIT-C score ≥8 represented alcohol misuse.

Mental health-related stigmatisation, attitudes to mental illness and perceived barriers to care were evaluated with questions commonly incorporated into scales used in both UK[20] and US military studies[21]. In addition, items taken from the barriers to access to care evaluation (BACE) scale[22] and the self-stigma of seeking psychological help scale (SSOSH)[23] were integrated into a combined measure. Individual question responses were based on a five item Likert scale. Scale response categories were strongly disagree, disagree, neither agree nor disagree, agree and strongly agree; responses were scored 1 through 5. Three scales were generated and scored separately; stigmatisation, practical barriers to care and attitudes to mental health, with higher scores representing more stigma, more negative attitudes etc. The scales were each summed and tertiles were generated from each scale count. Social support from family, friends and a significant other was measured using the multidimensional scale of perceived social support (MSPSS)[24]. The response scale for the measure was summed and quantiles were generated to provide a measure of low and medium versus high levels of social support.

Telephone interview study participants were asked whether they had accessed a range of potential sources of help. The help sources were organised hierarchically into four

categories; no help sought, informal sources only, inclusive of formal non-medical sources and inclusive of formal medical sources.

The ideation, SA and SH questions were based upon the deliberate self-harm component of the Clinical Interview Schedule–Revised (CIS-R), which is routinely used in the Adult Psychiatric Morbidity Survey for England[25]:

1. Have you ever made an attempt to take your life by taking an overdose of tablets or in some other way?
2. Have you ever thought of taking your life, even though you might not actually do it?
3. Have you ever deliberately harmed yourself in any way but not with the intention of killing yourself?

For each question, the response categories were yes/no. For yes responses, participants were further asked when the episode or attempt occurred. Only the last episode was captured.

Analyses

For both the cohort study and interview study, analyses were undertaken using the statistical package STATA v.15 (StataCorp, College Station, Texas, USA). At each phase of the cohort study, sample weights were calculated to represent the inverse probability of an individual being sampled from the following sub-groups: not deployed to Iraq or Afghanistan, Iraq or Afghanistan-deployed, new cohort participant and from regular forces or the reserve. Additional response weights were generated at each cohort phase which represented the inverse probability of responding once sampled. Factors predicting response included gender, age, rank, service, engagement type and serving status. At each phase of the cohort study, a single weight was generated by multiplying response and sample weights together. Full details of the procedure for generating the weights are provided in Hotopf et al, 2004,

Fear et al, 2010 and Stevelink et al, 2018a. In the telephone interview study component, using factors known to be associated with responding in UK military studies such as age, rank and service background, response weights were generated to account for non-response; the weights represented the inverse probability of responding once sampled. Details of the weighting procedure for the telephone interview study analyses can be found in Stevelink at al 2018b. At each study phase, mental disorder caseness was not associated with responding. The survey (svy) command was applied to all analyses to account for weighting. In both the cohort study and interview study analyses, descriptive statistics were generated for all study variables and were reported using unweighted cell counts and weighted percentages. In the cohort study, lifetime SH rates were examined at phases 1, 2 and 3 using unadjusted logistic regression analyses to produce odds ratios (ORs) with 95% confidence intervals (CIs). In the interview study, the associations between socio-demographic, mental disorder symptoms, stigmatisation, attitudes to mental disorder, perceived barriers to care, social support, help-seeking, SI and lifetime SH or SA were examined using unadjusted logistic regression analyses to produce ORs with 95% CIs. Odds ratios in the cohort and interview study analyses were further adjusted for a range of potential confounders which are detailed in the footnotes of each of the results tables. Trends in data were examined using Chi^2 test for linear trend. Statistical significance was defined as $p \leq 0.05$.

Results

Prevalence of lifetime SH by cohort study phase

We do not provide a description of the characteristics of the cohort study sample by phase as this is complex, has been reported in references 6, 7 and 8. At cohort study P1, the prevalence of lifetime SH was 1.8% among serving personnel and 3.8% among ex-serving veterans; at P2 the prevalence was 1.9% and 4.5% respectively and at P3 the prevalence was

4.2% among serving and 6.6% among ex-serving veterans. At all phases of the cohort study, there were significantly greater odds of SH occurring among ex-Service veterans following adjustment for potentially confounding variables. The trend in the increasing rate of SH over time was significant for both serving personnel (Chi^2 test for linear trend =89.3, $p<0.001$) and ex-serving veterans (Chi^2 test for linear trend =189.6, $p<0.001$).

In the interview study, where participants were selected on the basis of having experienced poor mental health, the prevalence of lifetime SH was 17.2% among serving personnel and 18.6% among ex-Service veterans; the difference in adjusted odds of experiencing lifetime SH between the two sub-samples was not significant (Table 1).

Associates of self-harm

Telephone interview sample characteristics

Sample characteristics are shown in the first column of table 2. Using published whole force composition data, it was possible to compare the sample with UK AF serving personnel characteristics. The sample was not representative of the composition of the UK AF as it contained a high proportion of Officers (25.1%) when around 15% would normally be representative. The age distribution was similarly unrepresentative with 20.7% aged between 18 and 34 years; the expected proportion of younger UK AF personnel would normally be around 67%. Women constituted 15.0% of the sample versus 10% in a representative, currently serving sample. Army personnel were similarly over-represented at 65.9%; around 50% would normally be representative. The reserve element was largely proportional (18.7% versus 16.0% in representative whole force sample)[26].

Self-harm, suicide attempts and suicidal ideation

Suicide attempts were reported by 9.7% of interview study respondents (n=139), 7.8% (n=11) occurred in the last year. Suicidal ideation was reported by 47.8% (n=691) of the study respondents with 35.7% of SI occurring in the last year (n=246). Self-harm was reported by 11.1% of participants (n=159) with 20.2% of SH events occurring in the last year (n=32).

Associates of lifetime suicide attempts

Socio-demographic factors

In adjusted analyses, age and sex were not significantly associated with lifetime SA. Compared to junior ranks, in adjusted analyses, commissioned officers were significantly less likely to report lifetime SA while non-commissioned officer rates were not significantly different to juniors. Compared to Army personnel, members of the Royal Air Force were significantly less likely to report lifetime SA while Royal Naval Service rates were not significantly different to Army rates. Compared to regulars, reserve service was significantly associated with lifetime SA in unadjusted analyses; when adjusted for the presence of mental disorder symptoms this became borderline non-significant. In the telephone interview study, serving or ex-Service status was not significantly associated with lifetime SA (Table 2).

The association between symptoms of mental disorder, alcohol misuse and lifetime suicide attempts

In analyses adjusted for socio-demographic and military factors, scoring positive for probable diagnoses of depression, anxiety disorder and PTSD were all associated with significantly increased odds of reporting lifetime SA while alcohol misuse was not. Reporting a lifetime history of suicidal ideation was significantly associated with lifetime SA with the largest effect size among all predictor variables. Subjectively higher levels of social support were significantly associated with significantly reduced adjusted odds of reporting lifetime SA.

Mental health-related stigmatisation and perceiving practical barriers to care were not significantly associated with SA when adjusted for socio-demographic factors and mental disorder symptoms. When adjusted for mental health disorders, negative attitudes to mental illness were not associated with lifetime SA. Compared to non-help seekers, only those seeking help from formal medical sources had significantly increased odds of reporting lifetime SA in adjusted analyses (Table 3).

Associates of lifetime self-harm

Socio-demographic factors

In adjusted analyses, compared to those aged 30 years and less, only those respondents aged 49 years and over were significantly less likely to report SH. There was a general trend for lower rates of SH to be reported with increasing age (Chi^2 test for linear trend=33.0, p=<0.001). Following adjustment for confounders, there were no differences in SH rates across three clustered rank groups. Female sex was significantly associated with lifetime SH in both unadjusted and adjusted analyses. Service background, engagement type and serving or ex-Service status were not associated with SH (Table 4).

The association between symptoms of mental disorder and alcohol misuse and lifetime self-harm

Scoring positive for probable diagnoses of depression, anxiety disorder and PTSD were all associated with significantly increased odds of reporting lifetime SH attempts in adjusted analyses; alcohol misuse was not associated with lifetime SH. Reporting a lifetime history of suicidal ideation was significantly associated with lifetime SH, while higher levels of social support were significantly associated with reduced odds of reporting lifetime SH. In adjusted analyses, both moderate and high levels of mental health-related stigmatisation the highest

levels of perceived practical barriers to care were significantly associated with lifetime SH. Only moderate levels of negative attitudes to mental ill-health were significantly associated with SH in adjusted analyses. Help seeking was not associated with SH when analyses were fully adjusted (Table 5).

Discussion

The main findings of this study of UK serving and ex-serving military personnel indicated that the prevalence of lifetime self-harm increased significantly at each of three measurement points, from around 2% among serving personnel and 5% in ex-Service veterans in 2004-06 to around 4% and 7% respectively in 2014-16. Reasons for the rise in the rate of SH and SA in the UK military over time are unclear and the apparent increase does not correspond to the reduction in the rate of completed suicide and open-verdict deaths observed over the same period[27]. Further research is required to establish why both SA and SH have increased over time in the UK AF.

The main socio-demographic associates of lifetime SA in the telephone interview study were commissioned officer rank and membership of the Royal Air Force. Both factors were associated with significantly reduced rates of lifetime SA compared to other ranks groups and Service backgrounds respectively. This may have been related to Officers and RAF personnel having greater educational attainment, a protective factor in mental health[28], and fewer risk factors more commonly found in junior ranks and other Service branches[29] such as childhood adversity, which is a powerful determinant of poorer mental health in adulthood[30].

Among the mental health-related associates of lifetime SA were current probable diagnoses of depression, anxiety disorder, PTSD and suicidal ideation. Mental disorder symptoms were measured using psychometric scales administered during the telephone interview whereas SH

accounts were largely retrospective. Current symptoms were therefore temporally disconnected from self-reported SA as only 7.8% of such attempts occurred in the last year. It is however possible that historical SA might represent a vulnerability to poorer mental health. There is substantial research evidence suggesting that all forms of SH are associated with an enduring heightened risk of mental distress[31] and completed suicide[32], particularly if such events are repetitious[33]. We were surprised to find that alcohol misuse was not significantly associated with either SA or SH despite being regularly cited as a risk factor for completed suicide[34]. Alcohol is thought to act as a disinhibiting agent, effectively shortening the time period between experiencing suicidal thoughts and self-injury[35]. The majority of SA and SH episodes were distal to the measurement of current alcohol intake which might again partially explain the lack of significant association. It may be the case that alcohol misuse is a risk factor that facilitates self-injury; we were unable to adequately assess this in the current study.

A significant protective factor, social support, had a buffering effect against both lifetime SA and SH. There is substantial research literature which consistently demonstrates a positive relationship between good social support, less suicidality and better mental health in military personnel[36 37]. In the context of military mental health support this represents an important focus for intervention as it is potentially modifiable given that most military activity is group-based. Improving social support for those at risk of suicide through multiple means may be a worthwhile intervention which should be at the forefront of suicide prevention.

Mental health-related stigmatisation was not associated with SA; however, stigma reduction efforts are often a central feature of suicide reduction campaigns[38].. The lack of association in our study notwithstanding, given that mental ill-health was significantly associated with both SA and SH and recent studies have shown that around 50% of UK AF personnel with

mental disorder symptoms do not seek help[8], it remains important to ensure that those with mental disorder symptoms are assisted to navigate barriers to care and to engage with evidence-based treatments.

Depression is amongst the most important disorders in heightened suicidality in military personnel[39] and is highly treatable using relatively simple psychological approaches[40]. Although anxiety and PTSD were associated with SA and SH, depression was the most substantial of the mental disorder risk factors in our study and is arguably highly modifiable. Although it is clearly important for symptomatic military personnel to receive mental healthcare, there was some evidence that seeking help from formal medical sources was significantly associated with lifetime SA. It is unlikely that formal medical help-seeking caused suicidality; however, UK military veterans are known to present for help at times of crisis[41] which could easily have included an episode of SH or SA.

The current study outcomes suggested that rates of SH decreased significantly with increasing age. This finding parallels other research suggesting that SH is a behaviour that is more common in youth[42]. A powerful associate of lifetime SH was female sex; women were however as likely as men to attempt suicide. Gender-specific mental health effects are frequently reported in the research literature[43 44] and could be an important consideration in the design of bespoke suicide prevention strategies.

SH which is not intended to end life may have unintended consequences which, in certain circumstances such as intoxication or misjudgement of lethality could result in death and there is some evidence that SH conveys an enduring heightened risk of completed suicide and all-cause premature death[45]. In keeping with the findings related to SA, probable diagnoses of depression, anxiety disorder and PTSD, but not alcohol misuse, were all associated with lifetime SH while reporting a lifetime history of suicidal ideation had the largest effect size.

Again, this reinforces the notion that facilitating timely treatment or therapy for mental disorder may be among the most important steps in any suicide reduction initiative.

In contrast to SA, mental health-related stigmatisation, negative attitudes to mental ill-health and perceived practical barriers to care were all significantly associated with SH. This is in keeping with the broader literature relating to stigma[46], particularly public stigma, which may sometimes be reality-based[47]. Other studies suggest that self-stigmatisation can create a 'why try' effect[48] where people do not fully engage with treatment as they believe that it is not effective for them. Consequently, hopelessness might become a risk factor for repeated SH and suicide. We suggest that although stigma reduction may be more relevant to those who self-injure rather than attempt suicide, minimising stigma and encouraging help-seeking should remain a central plank of any suicide reduction strategy.

Strengths and Weaknesses

Although the cohort study was designed to be broadly representative, the interview study sample was less representative of the UK AF and interpretations of our data should take account of this. The lack of representativeness may have been related to the recruitment strategy where participants were recruited on the basis of endorsing a subjective mental health problem in the last three years and also to the process of over-sampling of some sub-groups in the main cohort study. The telephone interview study sample was substantially older than would be expected in a representative sample, therefore the under-representation of groups at theoretically greater risk, namely younger personnel and lower ranks, may have influenced the outcomes[49]; however, other potential at-risk groups including women[50 51] and Army personnel[52] were over-represented. We were however, able to adjust for relevant confounding factors in the logistic regression analyses. As the telephone interview study participants were selected on the basis of having experienced poorer mental health, levels of

SH and SA were probably adequate to assess the association between a range of variables and the SH and SA outcomes. However; the higher rate of self-harm found in the interview study was undoubtedly related to the recruitment strategy and could represent a potential source of bias. Given that the study data were cross-sectional, we were unable to assess causality. Additionally, we only assessed the last episode of self-harm; assessing episodes of SH would have resulted in a much higher prevalence but would have provided a potentially confusing account due to clustering of SH at an individual level. Study strengths include a large sample, high response rate and the availability of detailed data derived from an extensive telephone interview.

Conclusion

The rate of lifetime self-harm increased significantly among UK AF serving personnel and ex-serving veterans from 2004 to 2016 with greater numbers of ex-Service veterans experiencing lifetime SH on each occasion that this outcome was measured. The main risk factors for both SA and SH among telephone interview study participants were symptoms of mental disorder and suicidal ideation. Subjectively higher levels of perceived social support were protective for both SA and SH. Stigmatising beliefs and more negative attitudes about mental illness and perceived barriers to care were associated with greater frequency of SH. The study outcomes suggest that UK military suicide prevention strategies should focus on the amelioration of mental disorder symptoms rather than alcohol use and should seek to encourage symptomatic individuals to engage with mental healthcare while attempting to reduce negative views of mental illness and fostering good social support.

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